High Sensitivity, Radiation Hard InGaAs LIDAR Receiver for Unmanned Aircraft Systems (UAS), Phase I

Completed Technology Project (2011 - 2012)

Project Introduction

NASA has a requirement for a large-area, high-quantum-efficiency, high-throughput optical receiver for ground-, air-, and space-based LIDAR systems. A radiation-hardened direct detection analog LIDAR receiver will be developed to address this need in the proposed STTR program. The rad-hard LIDAR receiver will be based upon a high gain (M > 1000), low excess noise (k ~ 0.02) InGaAs APD technology with high quantum efficiency (>80%) between 1000-1600 nm, deployed in a 61-element segmented array with a 600-um-diameter aggregate sensitive area. Segmentation of the detector area will minimize pixel capacitance, reducing amplifier noise and enabling GHz-class bandwidth. In Phase I, the proposed hexagonal APD array will be fabricated and hybridized to a custom fanout board for operation with discrete amplifiers. In the Phase II effort, a custom low-noise readout integrated circuit will be developed to mate directly to the hexagonal array, enabling higher sensitivity and higher bandwidth due to reduced interconnect parasitics. At the end of Phase II, the APD receiver will be integrated into a LIDAR test bed by the Electro-Optical Systems Laboratory at Georgia Tech for evaluation in a 6-month measurement campaign. Voxtel anticipates that its technology will enter the program at TRL=4, finish Phase I at TRL=5, and exit the Phase II program at TRL=7.

Primary U.S. Work Locations and Key Partners

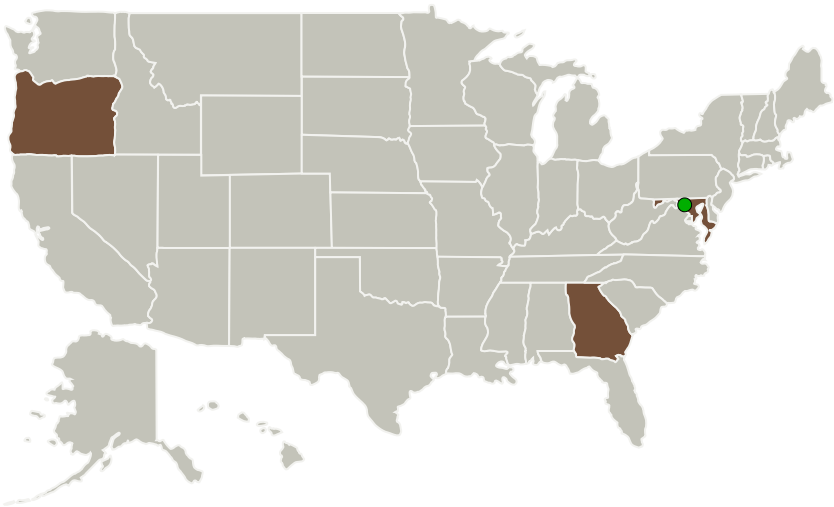

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Table of Contents

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Organizations Performing Work	Role	Type	Location
Voxtel, Inc.	Lead Organization	Industry	Beaverton, Oregon
Georgia Tech Applied Research Corporation	Supporting Organization	Academia	Atlanta, Georgia
Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
Georgia	Maryland
Oregon	

Project Transitions

February 2011: Project Start

February 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138219)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Voxtel, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

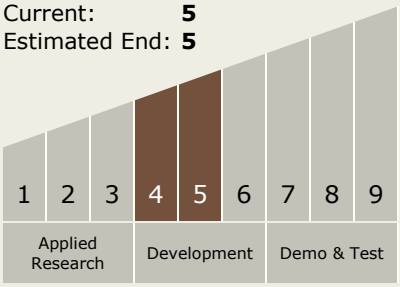
Carlos Torrez

Principal Investigator:

Andrew Huntington

Technology Maturity (TRL)

Start: **4**
Current: **5**
Estimated End: **5**



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Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.5 Lasers

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System